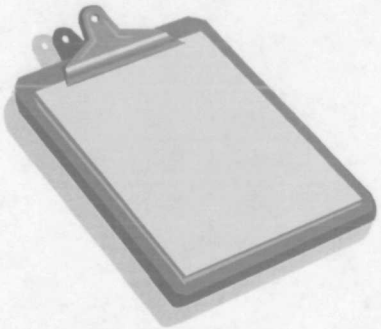
5/15/02 Plant Tour Leon Pruett Ward Wolleson Doug Tanner

5.1.6 EMCSF

Don Plant Tour Guide

A Message From Del Butler, Plant Manager



Welcome to the J.R. Simplot Company's **Don Plant**. Named after our founder's second son, the plant started up in 1944, and has been operating continuously ever since. Over so many years there have been many changes here. Frankly, about the only thing that hasn't changed is the name! New technology, new equipment, and new products have helped us develop one of the cleanest, most efficient phosphate fertilizer plants in North America.

Most people see us as just one big plant. As you will learn today, this facility is actually several simultaneous process units, each taking in raw product and turning it into one of the components of fertilizer.

We make our fertilizer out of three ordinary raw ingredients-phosphate ore, sulfur, and natural gas. We mine the phosphate ore in the mountains of southeast Idaho near the Wyoming border. Sulfur comes to us in railroad tank cars as a by-product from the natural gas fields of Wyoming. Natural gas piped into the plant supplies hydrogen, which we combine with nitrogen to make ammonia.

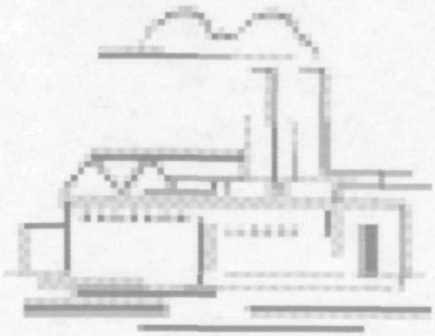
The Don Plant technology and science department has kept us on the leading edge of fertilizer production. More importantly, technology has enabled us to create a safe work environment. Today we use less brawn and more information technology. We are able to safeguard the health of our employees through improved methods of safety monitoring and measurement. Computerized operations give us an up-to-minute accounting of environmental emissions, enabling us to operate our plants well below the emission levels allowed by state and federal regulators.

While technology, equipment and plentiful natural resources are great; the people who work here are the largest part of the equation for our success. The employees, here at the Don Plant, are our greatest assets.

Even though we are unable, because of safety issues, to show you every part of the Don Plant, you are encouraged to ask your guide about all of our units. Enjoy the tour today.

Simplot

Bringing Earth's Resources to Life



J.R. Simplot Company
Agribusiness Group
Fact Sheet

Background: The J.R. Simplot Company's AgriBusiness started in 1944 J.R. Simplot built a small manufacturing plant west of Pocatello, Idaho to supply the company with phosphate fertilizers it needed to nourish thousands of acres of potatoes. Today the company operates four state-of-the-art fertilizer manufacturing plants in Idaho, California, and Manitoba, Canada. From the open pit mines in Southeastern Idaho, phosphate ore is supplied to the manufacturing complex near Pocatello. In 1992 the Group joined Farmland Co-op to form SF Phosphates Ltd., a company which acquired a large phosphate mine in Vernal, Utah and a state-of-the-art manufacturing complex in Rock Springs, Wyoming. The Group also operates a Silica Sand operation in Overton, Nevada and Agriculture Chemical formulating plants at Mountain Home, Idaho and Columbus, Mississippi.

Owners: The J.R. Simplot Company is owned entirely by J.R. Simplot and his immediate family.

Service Area: Simplot AgriBusiness products are marketed throughout the United States, Canada, and Mexico by highly trained wholesale representatives and by 100 Simplot Soilbuilders retail farm service centers located in 16 States, Canada and Austrilia

Headquarters: The Simplot AgriBusiness Group headquarters is currently located in Boise, Idaho.

Employees: 2100

Don Plant Anhydrous Ammonia, Phosphoric Acid, Super-phosphoric Acid, Mon-ammonium Phosphate, Purified Phos Acid, Mono-ammonium, Di-ammonium Phosphate, 0-45-0 Phosphate,

Sulfuric Acid, Nitric Acid, Urea, ammonium Nitrate, Feed Ammonium Sulfate

Slurried phosphate rock is delivered by pipeline from the Smoky Canyon Mine year round. The slurry is thickened to increase solids content from around 62% to 70%. The thickened slurry is stored in agitated tanks from which it is pumped into the phosphoric acid digester. The rock is reacted with sulfuric acid in the phosphoric acid plant to produce phosphoric acid and gypsum, the gypsum being a by-product.

The phosphoric acid produced in the phosphoric acid plant is 25% to 27% P_2O_5. Some of this acid is used directly to make various grades of fertilizers. However, most of it is concentrated up to 44%, 52%, and 69% P_2O_5.

The sulfuric acid used to make phosphoric acid is produced in two separate plants capable of making about 3,900 tons per day of sulfuric acid. The acid is produced by burning liquid sulfur with air to form SO_2. The SO_2 is then reacted with oxygen over a catalyst to form SO_3. The SO_3 is then absorbed in water, in the presence of 98% sulfuric, to form sulfuric acid.

The plant makes and ships five grades of solid fertilizers and four grades of liquid fertilizers. Three of the solids are designated as 'ammo-phos' (ammonium phosphate). They are 16-20-0 (ammonium phosphate-sulfate), 18-46-0 (di-ammonium phosphate), and 11-52-0 (mono-ammonium phosphate). Ammonium sulfate (21-0-0) is another solid fertilizer. The fifth is triple superphosphate (0-45-0).

In the manufacture of solid ammo-phos, the ammonia, phosphoric acid, and sulfuric acid are mixed in a reactor, forming a slurry. This slurry is then mixed with recycled fine product (finished product which is too small to be sold as fertilizer) in a granulator. The slurry coats the outside of the recycle particle to form a layer of fresh ammo-phos. The granulated material is then dried and screened. The oversized material is crushed and is recycled with the fines. When the desired size is achieved the product is cooled and conveyed to storage.

Crystalline ammonium sulfate is produced by reacting ammonia and sulfuric acid in a crystallizer under vacuum. The crystals, separated from the liquid phase by centrifuging, are dried and conveyed to storage and the liquid phase returned to the crystallizer as a "seed" solution.

Triple superphosphate (0-45-0) is produced by reacting ground limestone with phosphoric acid, using a patented Simplot process. This acidulated material is granulated, dried, and screened.

The three grades of liquid fertilizer are 0-52-0 (normal shipping acid), 0-69-0 (super acid), and 32-0-0 (UN-32, a solution of ammonium nitrate and urea). The first two are produced by vacuum evaporation of the 25% to 27% P_2O_5 acid produced in the process first described.

The 32-0-0 (UN-32) is made in a plant that is really three plants in one. Urea is produced by the reaction between carbon dioxide and ammonia in an autoclave. Nitric acid is produced by the conversion of ammonia into nitric oxides with subsequent solution in water. The nitric acid is reacted with ammonia to produce ammonium nitrate. The urea and ammonium nitrate are then dissolved in water in the proper ratio to produce a solution containing 32% nitrogen (32-0-0).

'Ammonia is produced by first mixing steam and natural gas together and passing it over a catalyst at high temperature and relatively high pressure to form hydrogen (H_2) and carbon monoxide (CO). Air is then mixed in with this stream to furnish the nitrogen requirements. The CO is converted to carbon dioxide (CO_2), absorbed from the gas stream, stripped from the recirculating absorbant, and discharged to the atmosphere or converted to liquid CO_2. Any unabsorbed CO_2 is then reacted with hydrogen to form methane and water. The water is removed, and the gaseous stream is then compressed to a high pressure (4,200 psig) and passed over a catalyst to form ammonia from the nitrogen and hydrogen. The basic reactions occuring in the plant are:

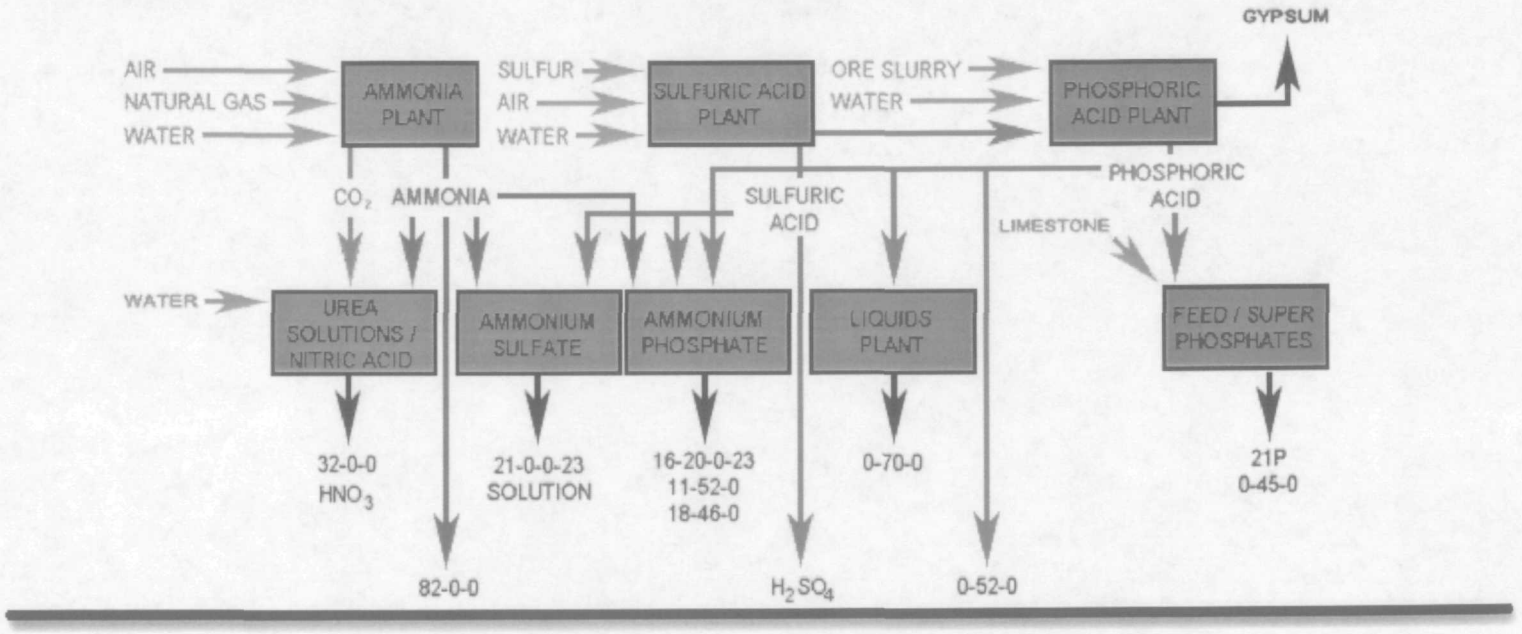
PRIMARY REFORMING: $CH_4 + 2H_2O \longrightarrow CO_2 + 4H_2$

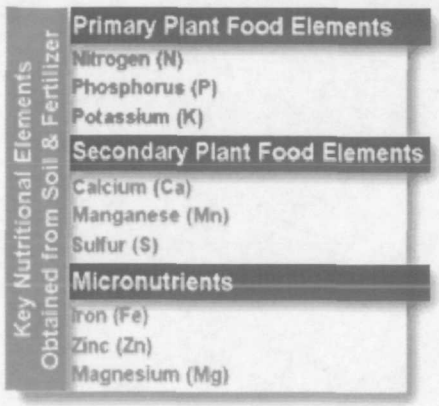
SECONDARY REFORMING: $CH_4 + 2H_2O \longrightarrow CO_2 + 4H_2\ N_2 + O_2 + 2H_2 \longrightarrow 2H_2O + N_2$

CO CONVERTER: $CO + H_2O \longrightarrow CO_2 + H_2$

METHANATOR: $CO + 3H_2 \longrightarrow CH_4 + H_2O$

SYNTHESIS: $N_2 + 3H_2 \longrightarrow 2NH_3$





Fertilizers as a Source of Plant Nutrients

There are 16 elements that are known to be essential for plant growth and development.

Three of the sixteen essential elements -- carbon, hydrogen, and oxygen -- are taken primarily from the air and water. Oxygen and hydrogen are obtained by plants from water. Carbon and hydrogen are taken in by the leaves from the air. The other thirteen elements utilized by the plant must come from the soil or from added fertilizer materials.

Crop removal of these elements, plus leaching, volatilization, and erosion, causes the soil fertility to be continually reduced. Soil productivity can be maintained by well managed, scheduled applications of multiple element fertilizers.

The first fertilizers used were animal manures, plant and animal remains, ground bone, and potash salts acquired from wood ashes. There were three major developments in 19th century Europe which greatly contributed to the advancement of the fertilizer industry:

1. In 1839, potassium salt deposits were discovered in the German states.
2. In 1842, superphosphate was formed from the treating of ground phosphate rock with sulfuric acid.
3. In 1884, ammonia was formed by combining hydrogen and atmospheric nitrogen.

Fertilizer Nutrients

A grade is assigned to fertilizers to provide information on the nutritional contents of a particular fertilizer. The grade is represented by three numbers showing the weight percent of nitrogen, phosphorus, and potassium (potash) contained in that fertilizer. The grade is sometimes written as a ratio. For example, a 16-6-8 grade is a 8-3-4 ratio.

But a fertilizer 16-6-8 analysis adds up to only 30% plant food. What is the other 70%?

It is not a filler; it is the way the plant food is chemically compounded so plants can utilize it. Plants can't use elemental nitrogen (N), they only take up nitrogen when it is in the NO_3 or NH_4 form. This means that for each part of nitrogen, you have three parts of oxygen with NO_3 or 4 parts of hydrogen with NH_4. In fact, elemental phosphorus, one of the main plant nutritional requirements, is actually poisonous to plants unless it is in a compound such as H_3PO_4.

The Primary Plant Food Elements.

Nitrogen (N)

1. Promotes rapid vegetative growth (leaf and stems) -- hastening recovery after mowing and imparting vigor to the turf.
2. A vital element in the formation and function of chlorophyll -- the key ingredient imparting dark green color.
3. Synthesizes amino acids which in turn form protein.
4. Regulates the uptake of other nutrients.
5. Basic ingredient of vital compounds - nucleic acid and enzymes.

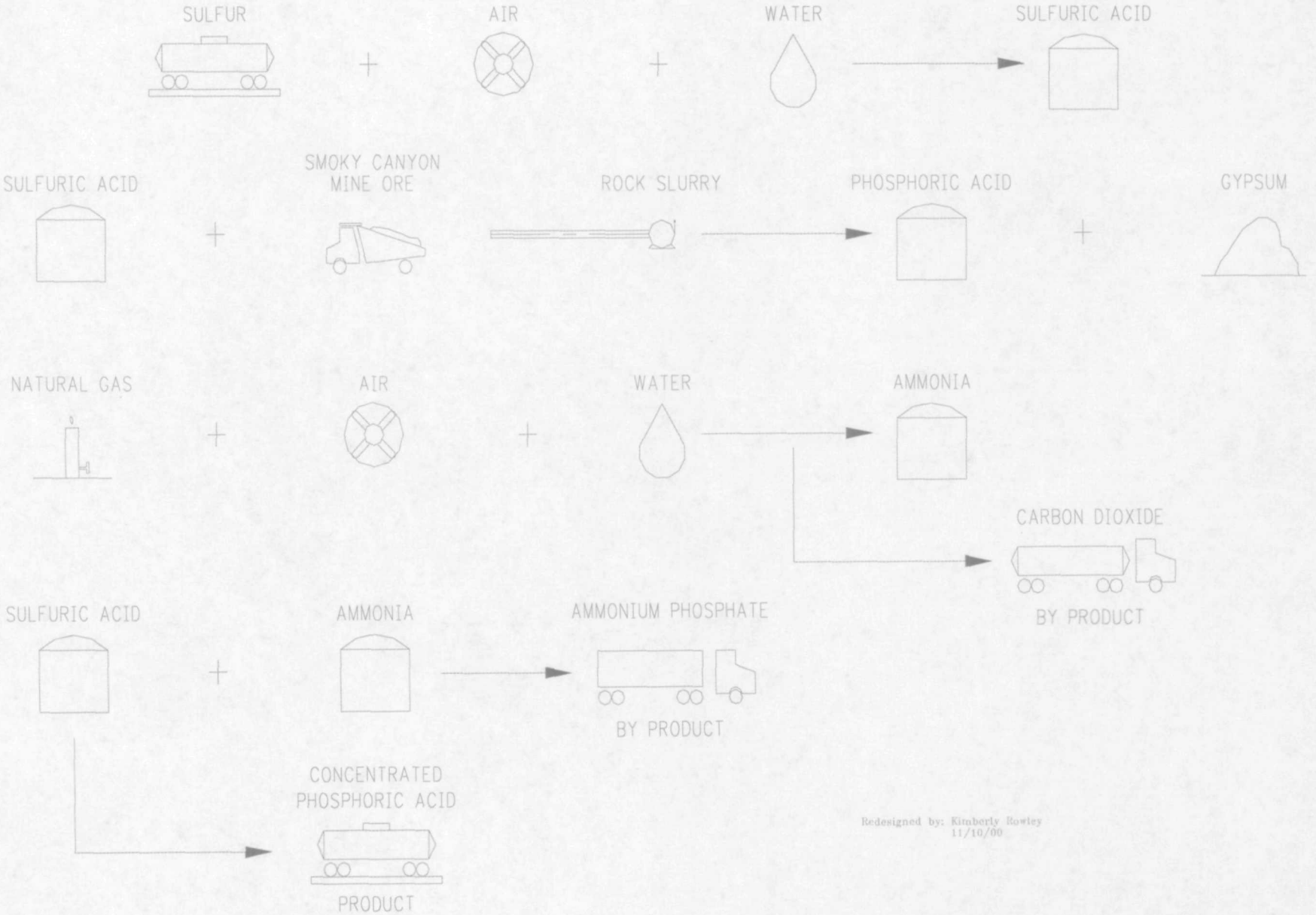
Phosphorus (P)

1. Stimulates early root formation and growth -- gets plants off to a good start and forms a root filter system in the soil to efficiently pick up the other available plant nutrients and water. Improves the strength and stamina of the plant.
2. Hastens maturity (conversion of starch to sugar).
3. Stimulates blooming and seed development.
4. Causes energy transformation and conversion processes in which sugars are converted to hormones, protein and energy to grow new leaves and fruit.
5. Forms nucleic acids (DNA and RNA).
6. Vital for photosynthesis (greening of plants).
7. Essential for cell division.

Potassium (K)

1. Aids in the development of stems and leaves.
2. Increases disease resistance and hardiness which helps wearability.
3. Strengthens cell walls, causing grass to stand up, and reduces lodging.
4. Affects water intake by plant cells -- plants with inadequate potassium may wilt in the presence of ample moisture.
5. Acts as a catalyst in iron uptake.
6. Essential to the formation and translocation of protein, starches, sugar and oil -- improving the size and quality of fruit, grains and tubers.

How We Make Fertilizer

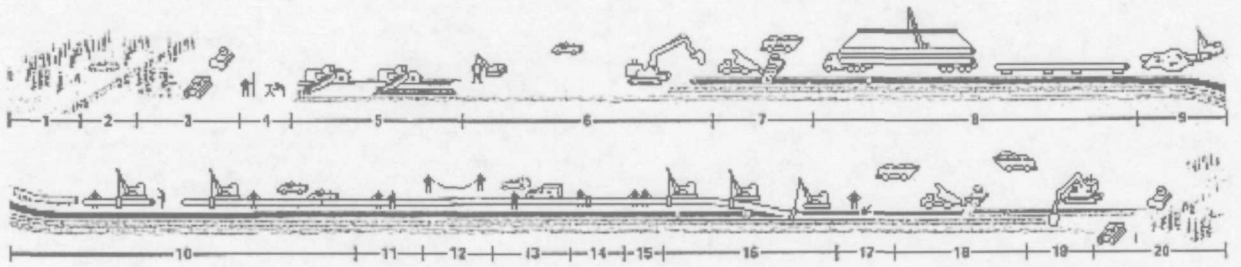


Redesigned by: Kimberly Rowley
11/10/00

The J.R. Simplot Company Ore-Slurry Pipeline

The J.R. Simplot Company's ore-slurry pipeline establishes a new standard of environmental stewardship in the phosphate mining industry. Starting from Simplot's Smoky Canyon phosphate mine near the Idaho-Wyoming border, the slurry pipeline delivers over a million and a half tons of raw phosphate rock annually to the company's manufacturing complex 87 miles away in Pocatello, Idaho.

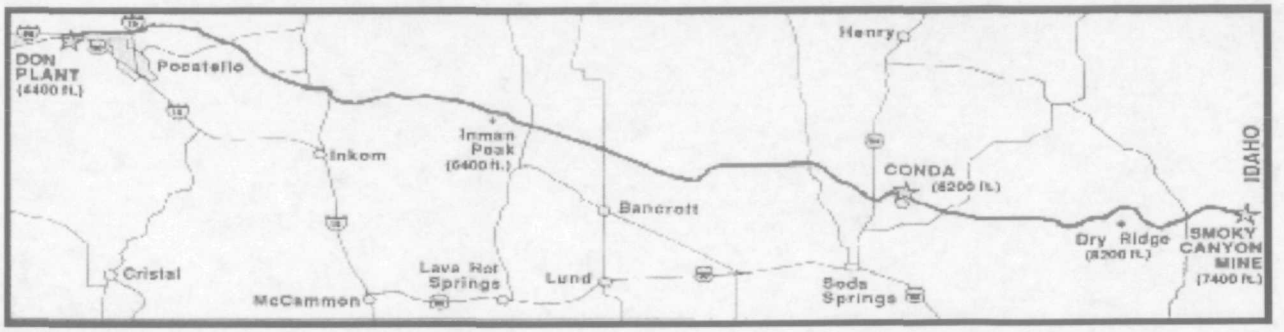
The Agri-Business Group of the Simplot Company has utilized slurry pipelines to transport raw materials since 1984. The 87 mile ore-slurry pipeline project has significantly reduced dust, smoke, and carbon monoxide pollution by using water to transport raw phosphate ore to the manufacturing complex, and then recycling that water to use in other processes at the complex. Overall water demand at the Pocatello complex has been reduced by 500 gallons per minute.

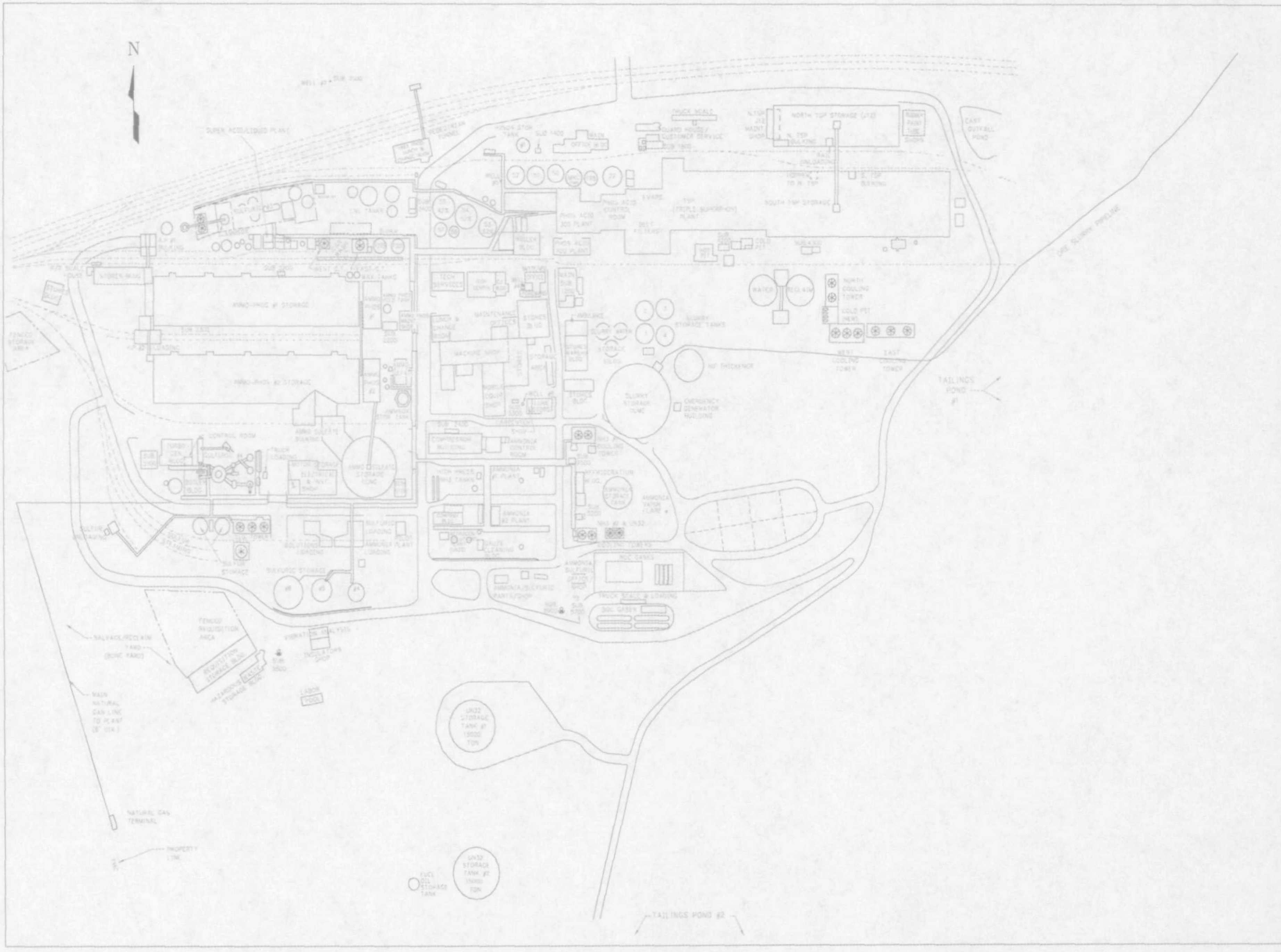


LEGEND

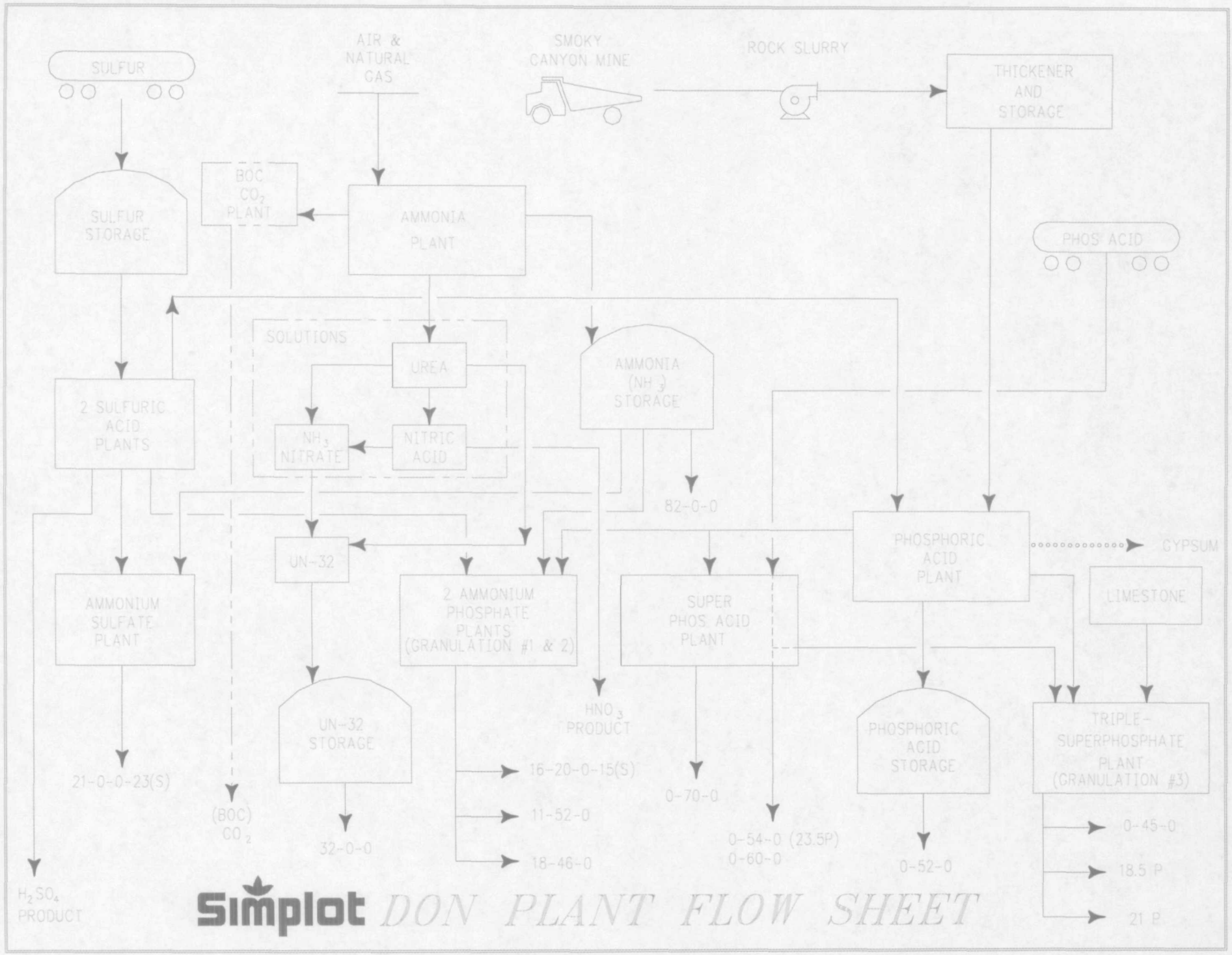
1 - Right-of-Way Acquisition and Survey	**6** - Ditching (Rock)	**11** - Fill and Cap Weld	**16** - Lowering In
2 - Fencing	**7** - Padding Ditch Bottom	**12** - As-Built Footage	**17** - As-Built Profile Survey
3 - Clearing and Grading	**8** - Stringing	**13** - X-Ray and Weld Repair	**18** - Padding Over Pipe
4 - Centerline Survey of Ditch	**9** - Bending	**14** - Coating Field and Factory Welds	**19** - Backfill
5 - Ditching (Rock Free)	**10** - Line Up	**15** - Repair & Inspection of Coating (Jeeping)	**20** - Replace Topsoil & Cleanup

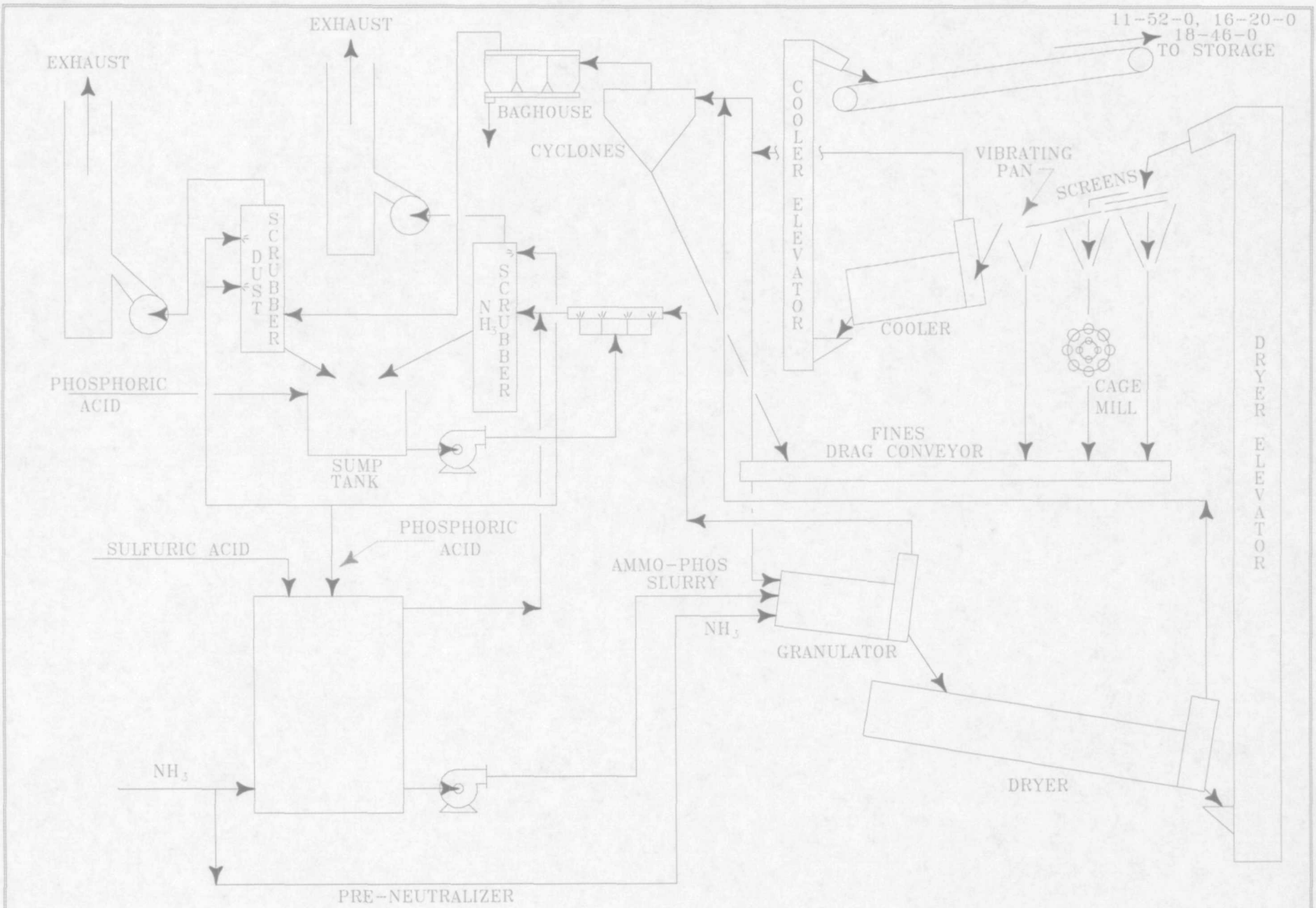
The J.R. Simplot Company's ore-slurry pipeline transports over a million and a half tons of refined phosphate ore over the mountainous terrain annually. The raw phosphate rock is mined, refined, and ground into a fine powder at Simplot's Smoky Canyon Mine near Star Valley, Wyoming. There the ore is mixed with water (a 60:40 ore to water ratio) and injected into the eight inch pipeline. A 1000 horse power pump at Smoky Canyon (elevation 7400 ft.) pumps the "slurry" 27 miles to Conda, Idaho (elevation 6200 ft.), crossing Dry Ridge (8200 ft.). At Conda, two 1200 horse power booster pumps provide additional power to push the slurry another 60 miles, crossing Inman Peak (6400 ft.) and ending up at the Pocatello manufacturing complex (4400 ft.). A series of pressure chokes creates a back-flow pressure which keeps the slurry velocity constant at six feet per second throughout the 87 mile journey.



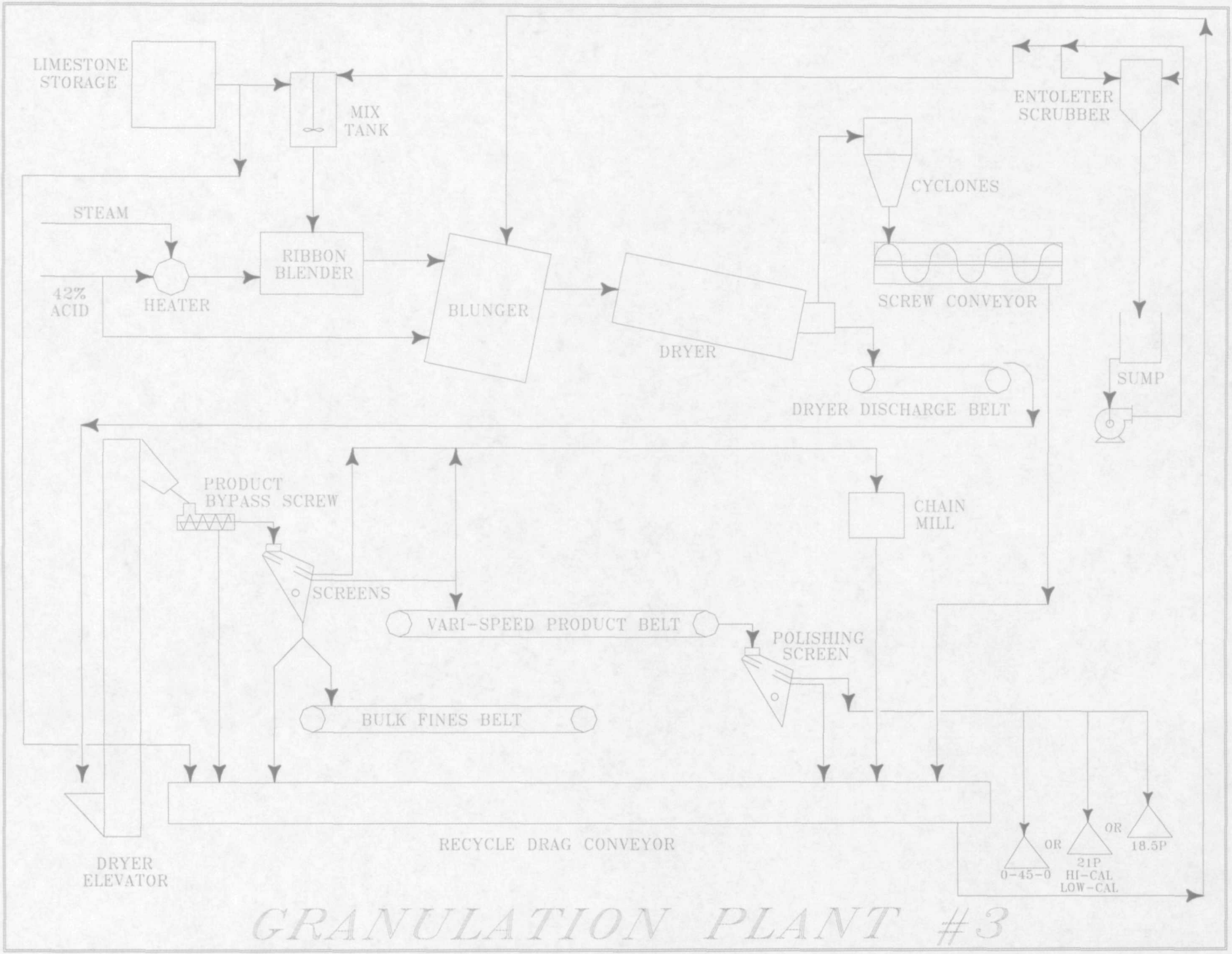


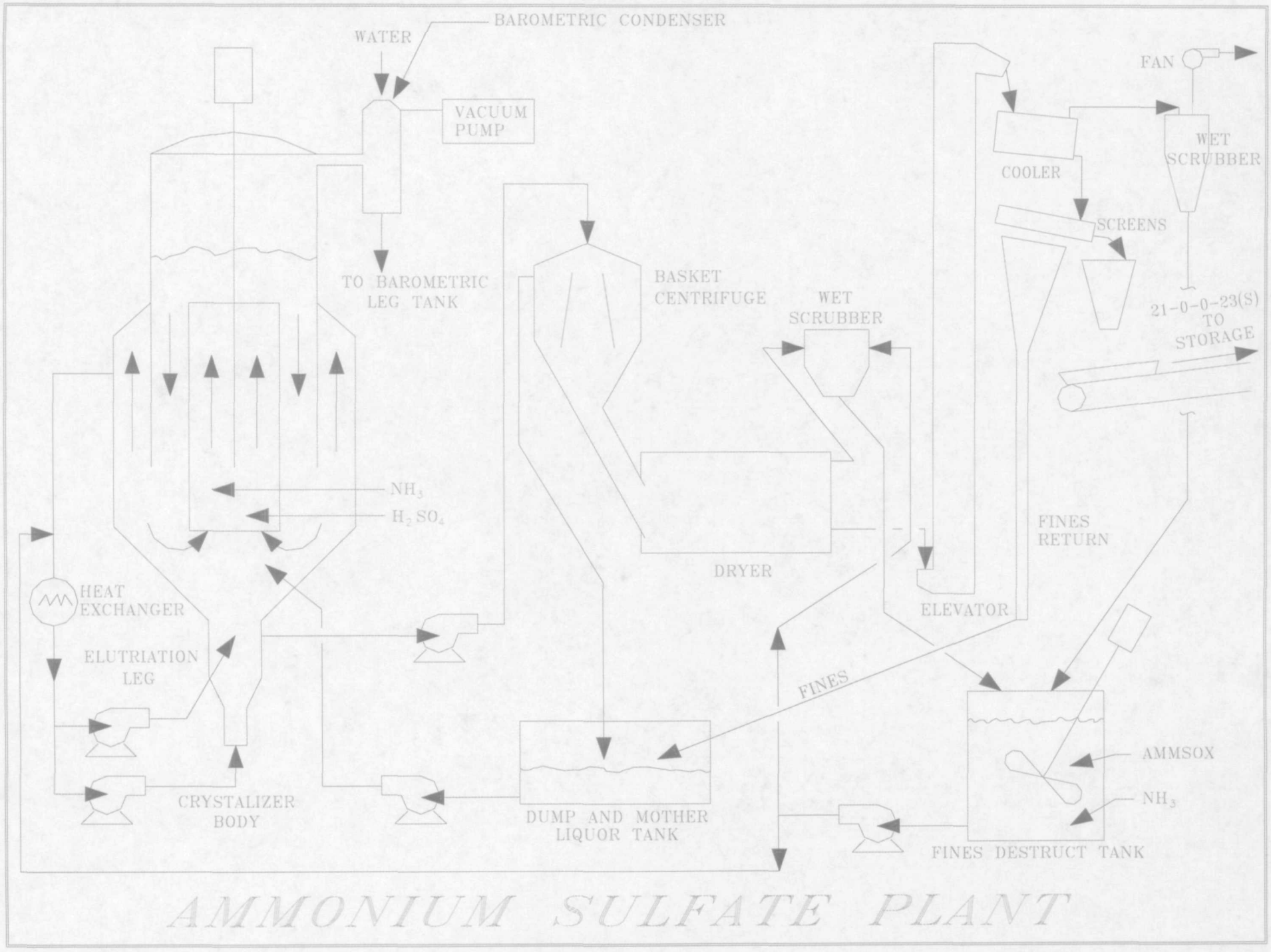
N
TAILINGS POND #2
TAILINGS POND #1

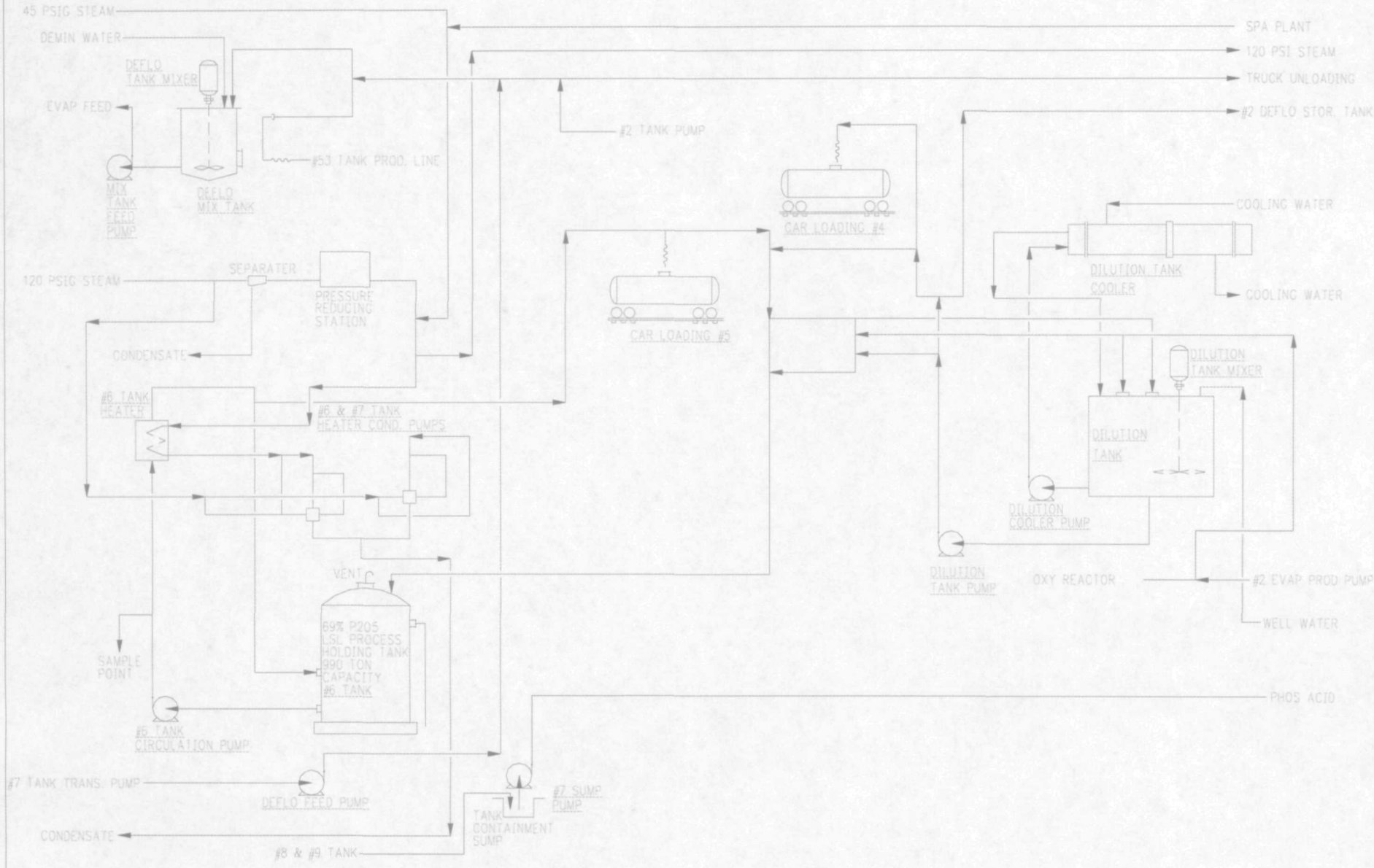

SULFUR
AIR & NATURAL GAS
SMOKY CANYON MINE
ROCK SLURRY
THICKENER AND STORAGE
SULFUR STORAGE
BOC CO_2 PLANT
AMMONIA PLANT
PHOS ACID
SOLUTIONS
UREA
AMMONIA (NH_3) STORAGE
2 SULFURIC ACID PLANTS
NH_3 NITRATE
NITRIC ACID
82-0-0
UN-32
PHOSPHORIC ACID PLANT
GYPSUM
AMMONIUM SULFATE PLANT
2 AMMONIUM PHOSPHATE PLANTS (GRANULATION #1 & 2)
SUPER PHOS ACID PLANT
LIMESTONE
UN-32 STORAGE
HNO_3 PRODUCT
PHOSPHORIC ACID STORAGE
TRIPLE-SUPERPHOSPHATE PLANT (GRANULATION #3)
21-0-0-23(S)
16-20-0-15(S)
0-70-0
(BOC) CO_2
11-52-0
0-45-0
32-0-0
0-54-0 (23.5P)
0-60-0
0-52-0
18.5 P
18-46-0
21 P
H_2SO_4 PRODUCT
Simplot DON PLANT FLOW SHEET



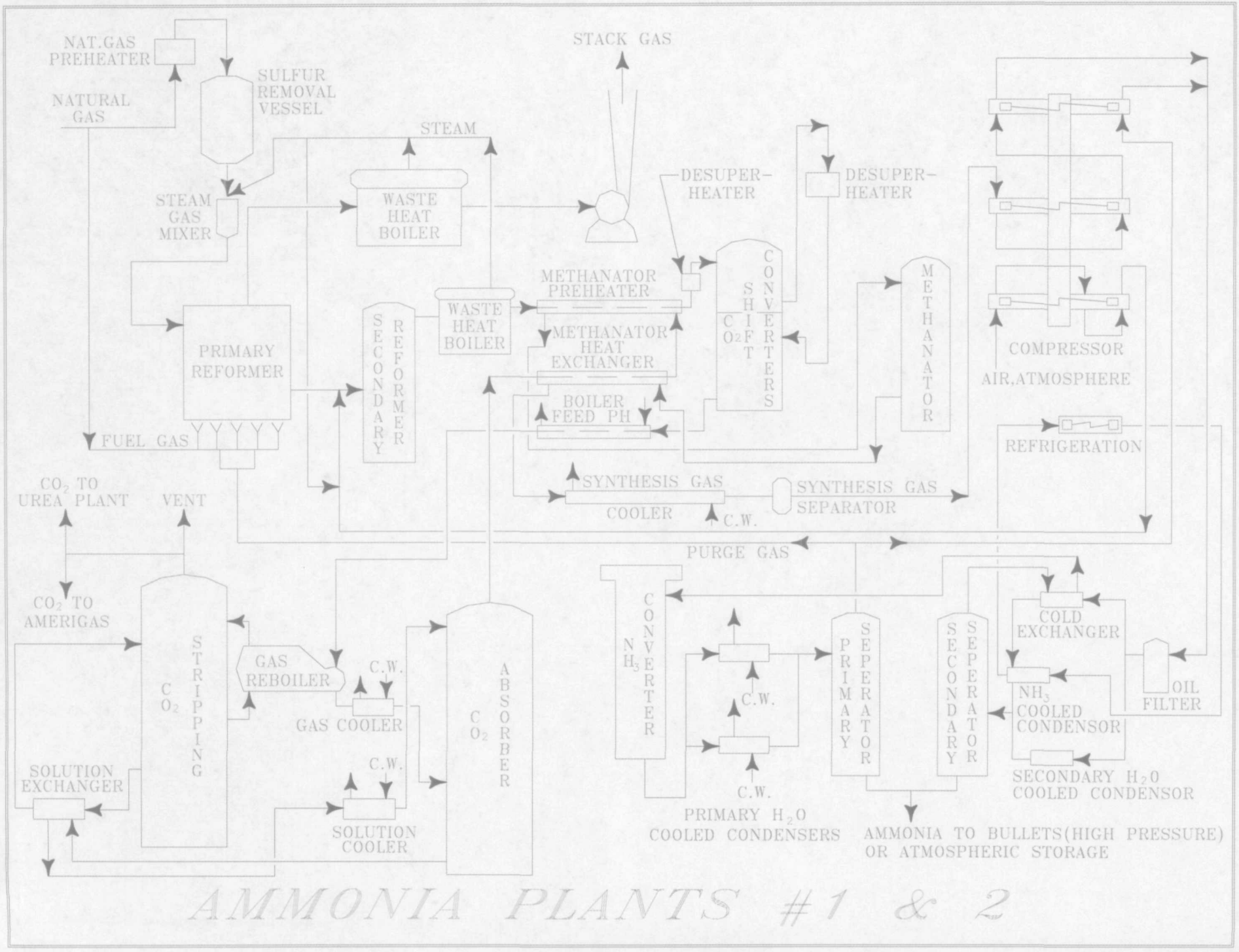
GRANULATION PLANTS #1 & 2


LIMESTONE STORAGE
MIX TANK
ENTOLETER SCRUBBER
CYCLONES
STEAM
RIBBON BLENDER
42% ACID
HEATER
BLUNGER
DRYER
SCREW CONVEYOR
SUMP
DRYER DISCHARGE BELT
PRODUCT BYPASS SCREW
CHAIN MILL
SCREENS
VARI-SPEED PRODUCT BELT
POLISHING SCREEN
BULK FINES BELT
RECYCLE DRAG CONVEYOR
DRYER ELEVATOR
OR
0-45-0
OR
21P
HI-CAL
LOW-CAL
18.5P
GRANULATION PLANT #3

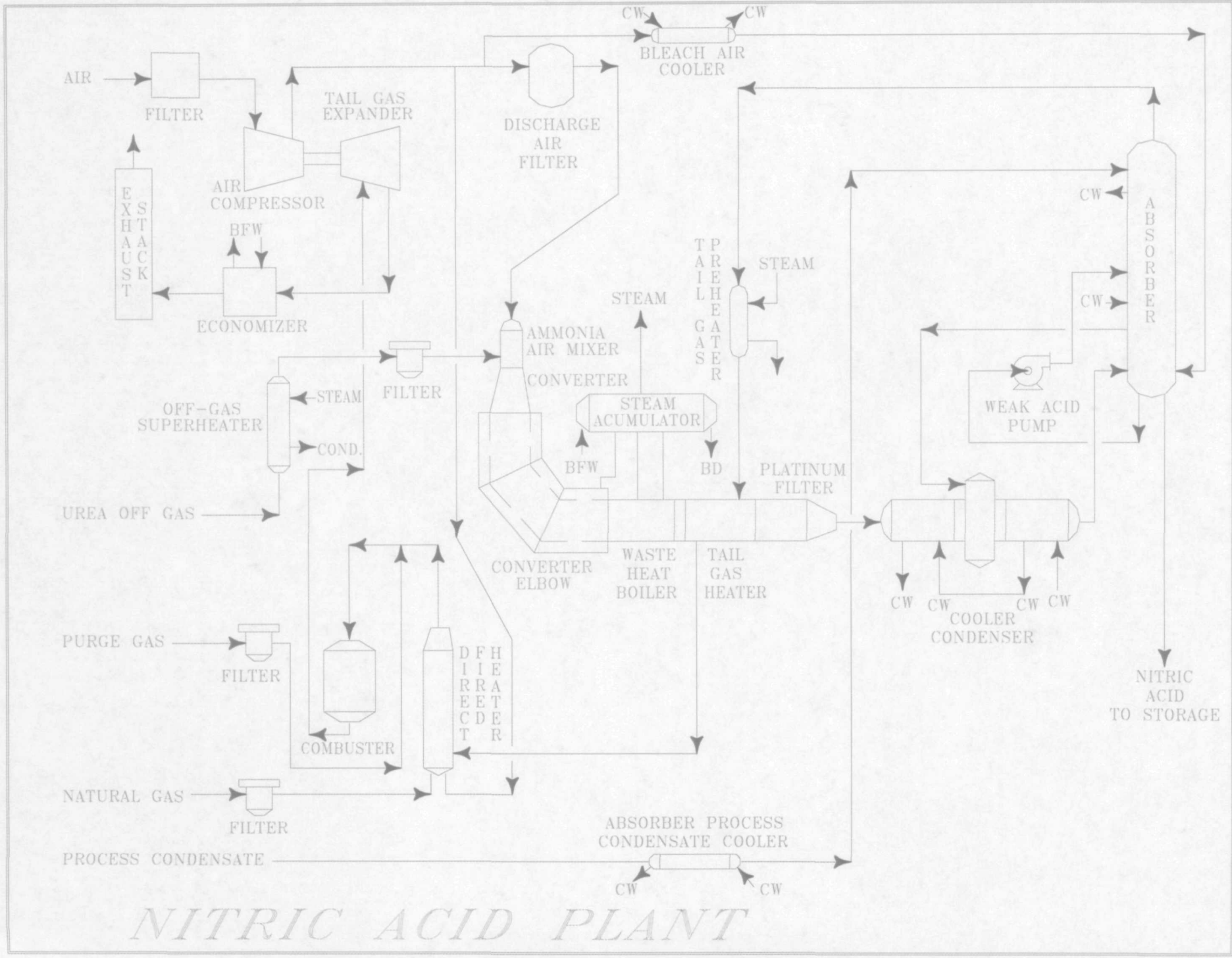

WATER
BAROMETRIC CONDENSER
VACUUM PUMP
TO BAROMETRIC LEG TANK
BASKET CENTRIFUGE
WET SCRUBBER
FAN
COOLER
WET SCRUBBER
SCREENS
21-0-0-23(S) TO STORAGE
NH_3
H_2SO_4
DRYER
FINES RETURN
HEAT EXCHANGER
ELUTRIATION LEG
ELEVATOR
FINES
AMMSOX
NH_3
CRYSTALIZER BODY
DUMP AND MOTHER LIQUOR TANK
FINES DESTRUCT TANK
AMMONIUM SULFATE PLANT



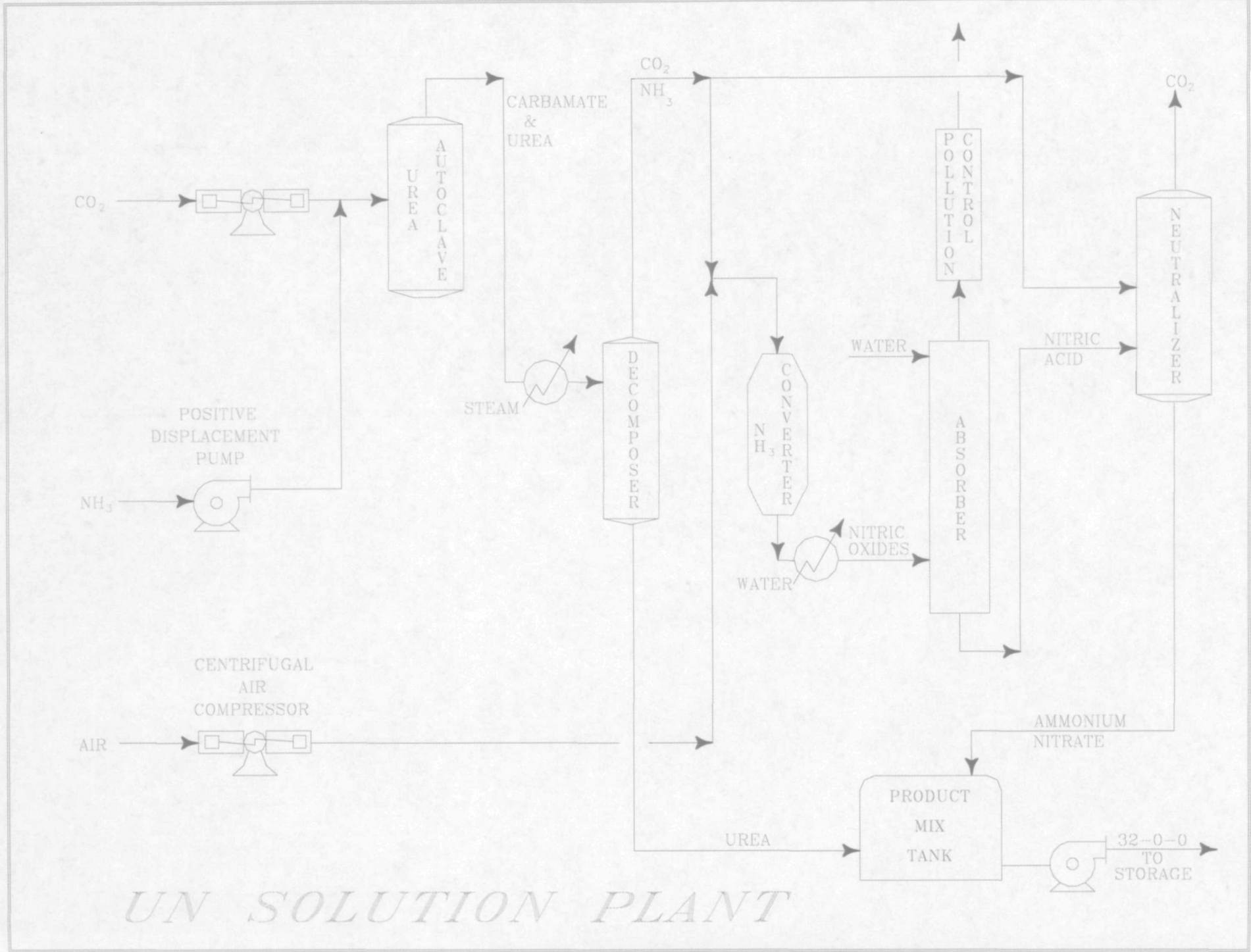
DEFLOURINATED SUPER PHOSPHORIC ACID



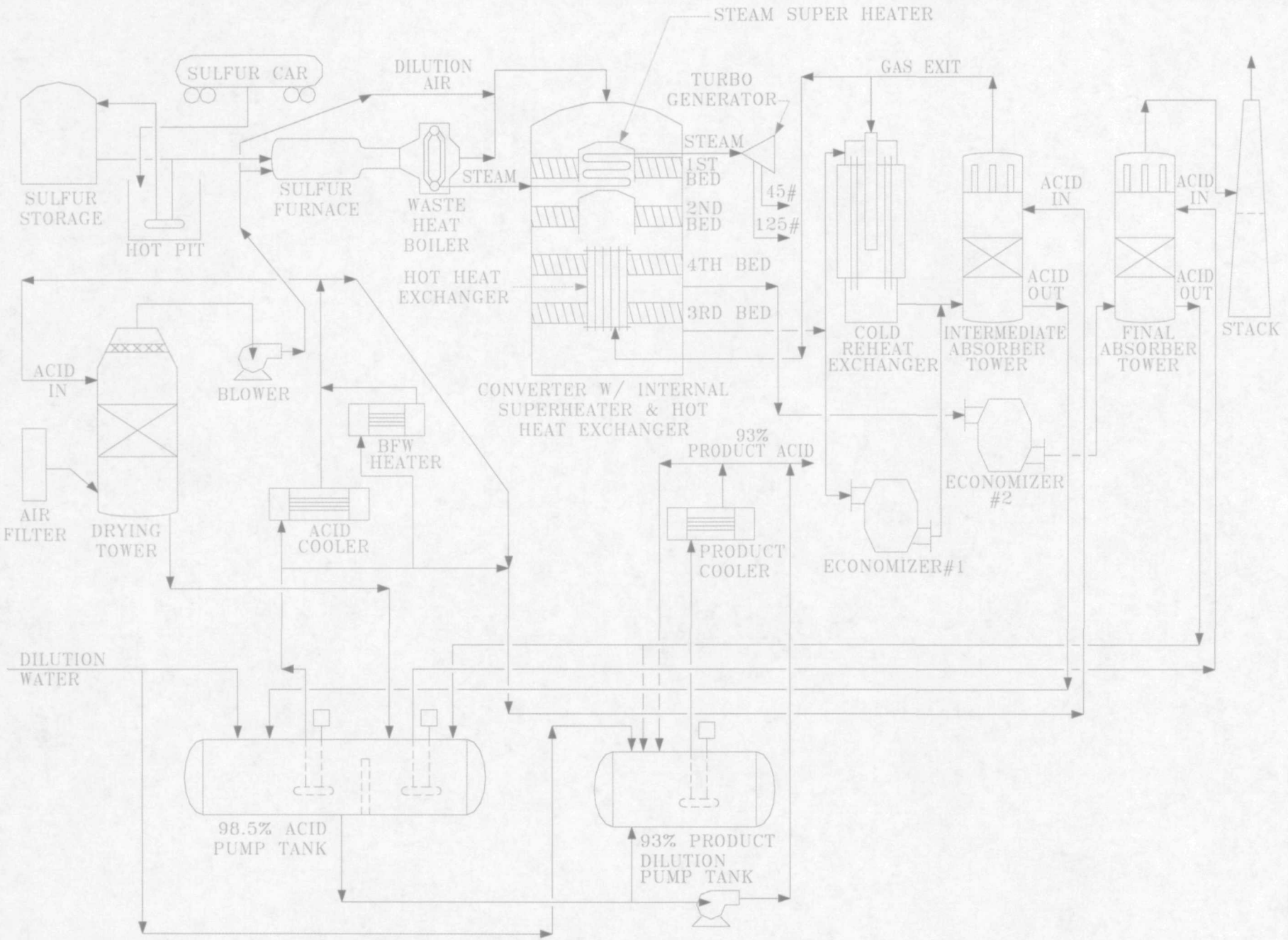
AMMONIA PLANTS #1 & 2



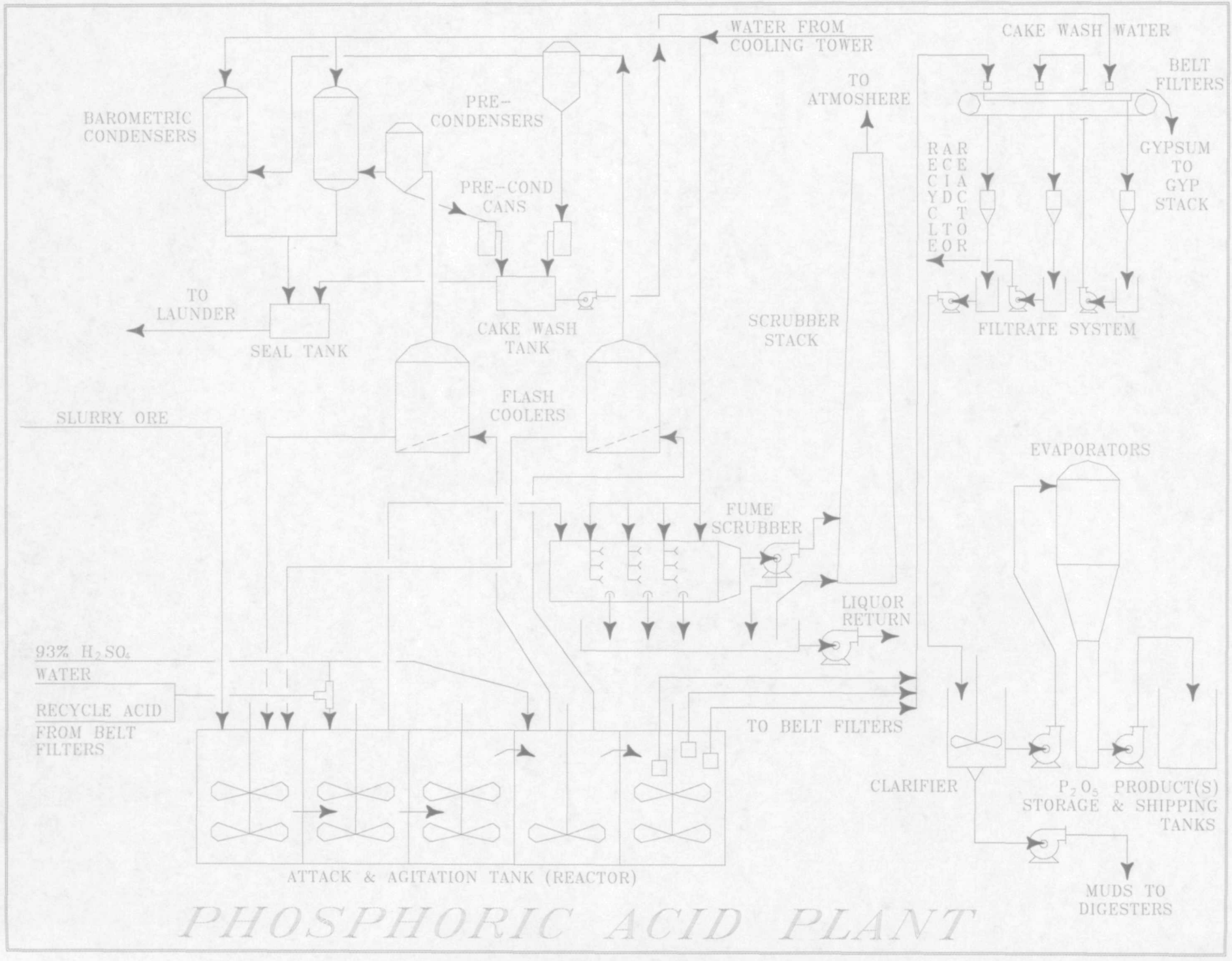
NITRIC ACID PLANT

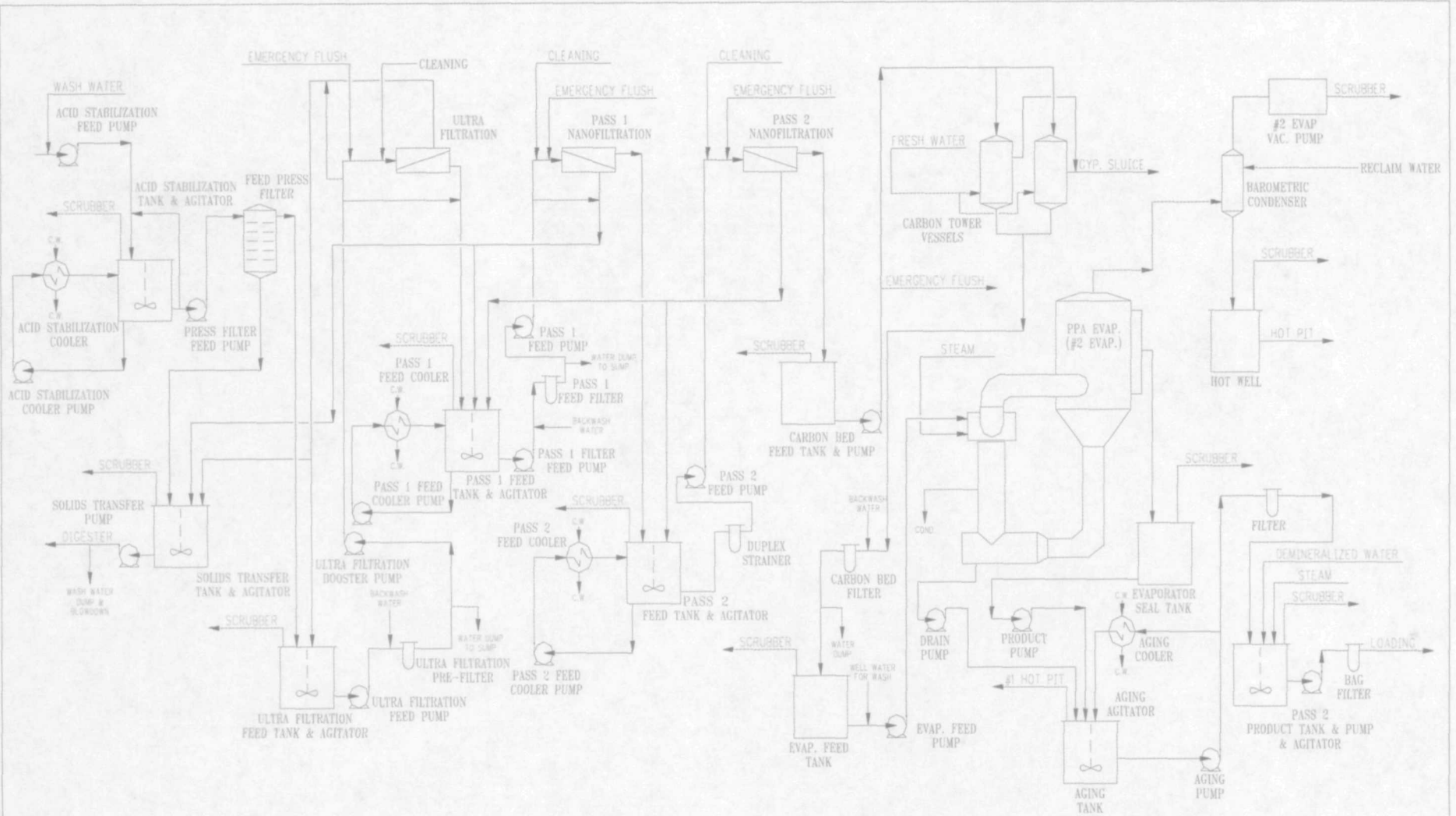


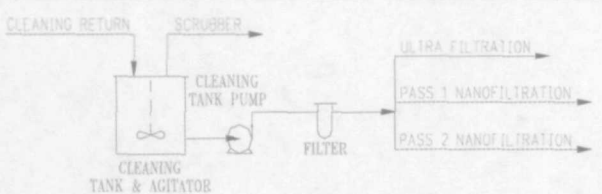
UN SOLUTION PLANT



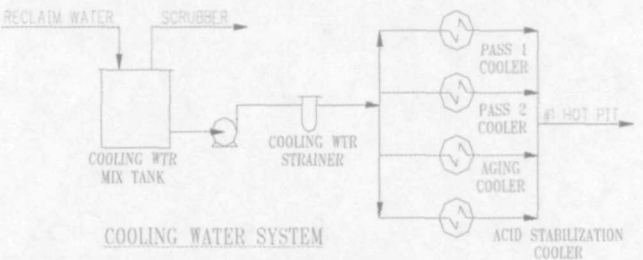
SULFURIC ACID PLANTS #3 & 4


WATER FROM COOLING TOWER
CAKE WASH WATER
BELT FILTERS
TO ATMOSHERE
BAROMETRIC CONDENSERS
PRE-CONDENSERS
PRE-COND CANS
RAR ECE CIA YDC C T LTO EOR
GYPSUM TO GYP STACK
TO LAUNDER
SEAL TANK
CAKE WASH TANK
SCRUBBER STACK
FILTRATE SYSTEM
FLASH COOLERS
SLURRY ORE
EVAPORATORS
FUME SCRUBBER
LIQUOR RETURN
93% H_2SO_4
WATER
RECYCLE ACID FROM BELT FILTERS
TO BELT FILTERS
CLARIFIER
P_2O_5 PRODUCT(S) STORAGE & SHIPPING TANKS
ATTACK & AGITATION TANK (REACTOR)
MUDS TO DIGESTERS
PHOSPHORIC ACID PLANT



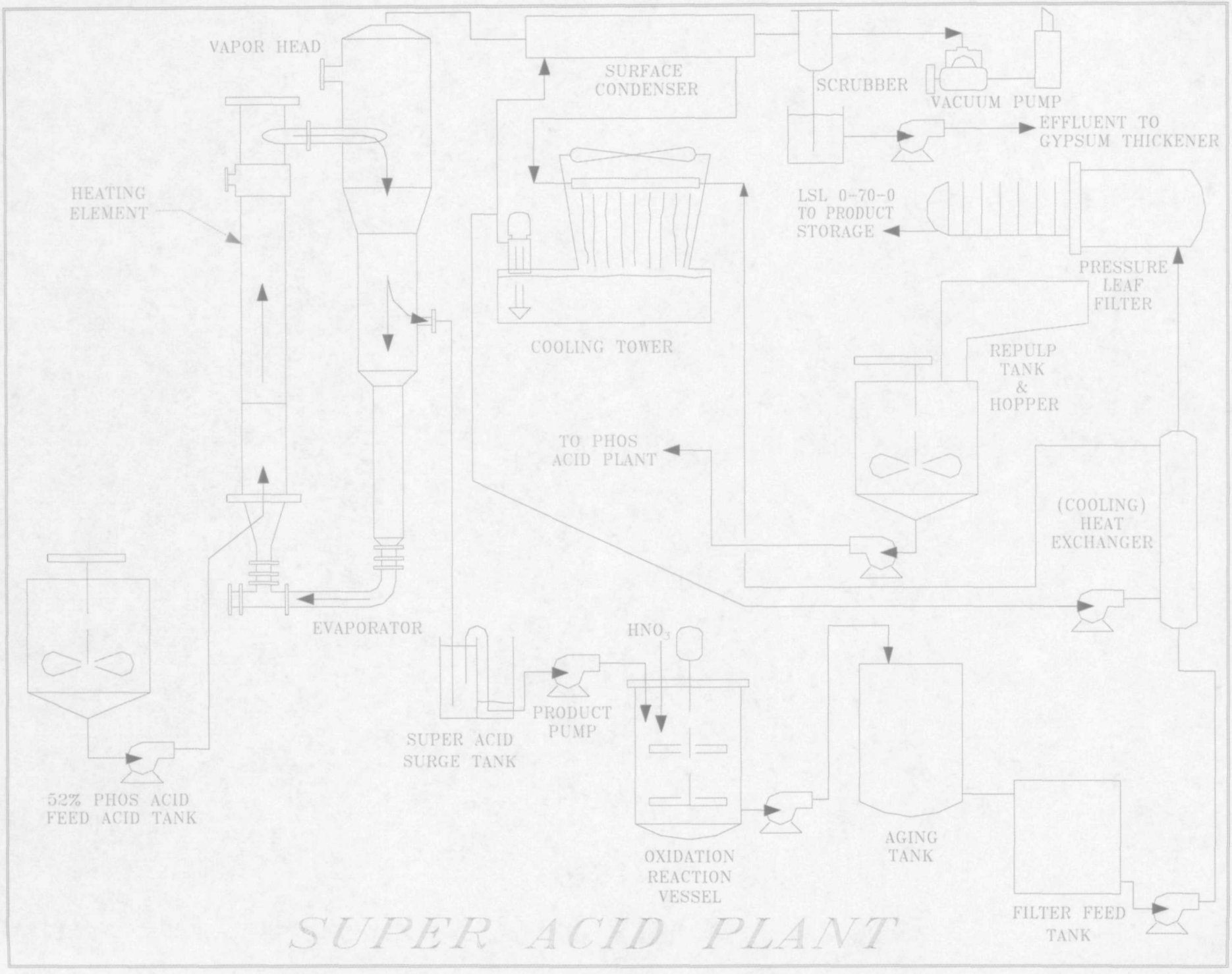


CLEANING SYSTEM



COOLING WATER SYSTEM

PURIFIED PHOS ACID PLANT


VAPOR HEAD
SURFACE CONDENSER
SCRUBBER
VACUUM PUMP
EFFLUENT TO GYPSUM THICKENER
HEATING ELEMENT
LSL 0-70-0 TO PRODUCT STORAGE
PRESSURE LEAF FILTER
COOLING TOWER
REPULP TANK & HOPPER
TO PHOS ACID PLANT
(COOLING) HEAT EXCHANGER
EVAPORATOR
HNO_3
PRODUCT PUMP
SUPER ACID SURGE TANK
52% PHOS ACID FEED ACID TANK
OXIDATION REACTION VESSEL
AGING TANK
FILTER FEED TANK
SUPER ACID PLANT